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WISCONSIN NATURAL RESOURCES

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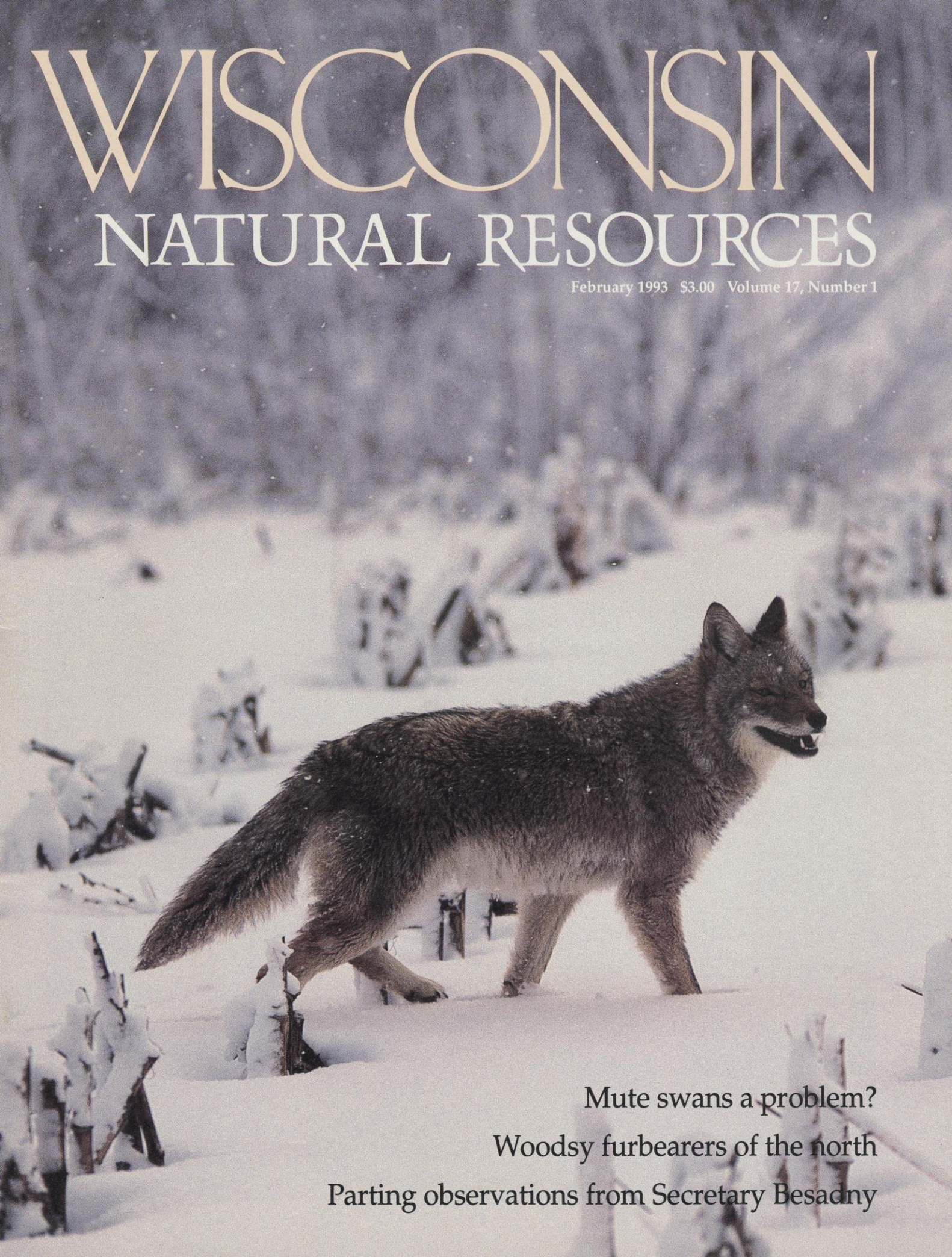

Mute swans a problem?

Woodsy furbearers of the north

Parting observations from Secretary Besadny

Wisconsin's other winters

Anita Carpenter

Winter envelops Wisconsin in ever-changing moods and scenes. One day an angry, howling blizzard piles wind-driven snow into hard-packed sculpted drifts. All creatures, including us, seek shelter. The storm recedes followed by bright, crisp days when snow crunches underfoot and rejoicing cardinals whistle. Although we'd like these days to linger, winter marches on. The plodding, somber gray days of impending snow return. Eventually the clouds release their snowy load as snowflakes drifting on gentle winds. After the skies clear, a tranquility settles over the snow-covered land. Walk when the moon is full. In the cold night air, the fresh snowflakes sparkle. Overhead, the twinkling stars rule. The shadows stretch out before you in the moonlight and night is almost as bright as day. Only the low hoots of a distant great horned owl break the silence.

This cold season, with its kaleidoscope of moods and scenes, is not the only winter in Wisconsin. Adding life and color to the snowy scene are the organisms with winter in their names: wintergreen, winterberry and winter wrens.

Under the snow blanket, evergreen leaves of wintergreen persist. A ground-loving perennial that thrives in the dry, acidic soils of our northern hardwoods, wintergreen (*Gaultheria procumbens*) is a miniature member of the Ericaceae or heath family. Other shirttail relatives include trailing arbutus, wax flower, Labrador tea and blueberries. Like many of these species, wintergreen retains its leaves through winter — the derivation of its common name.

During the warm growing season, wintergreen creeps along the forest floor, extending its underground stem and sending up new shoots. Each five-inch erect stem is tipped with a cluster of small, thick, oval, slightly toothed leaves. Crush a leaf and the smell of wintergreen rises to meet you. Individual frost-white, bell-shaped flowers are formed by the fusion of five petals. They nod toward the ground on tiny recurved stalks. After pollination by insects, small red berrylike fruits mature and hang on the stem until spring unless grouse, mice or deer discover the tasty aromatic morsels. Those fruits that survive either rot or drop to the ground, releasing seeds which may germinate to produce new plants.

Continued on page 31

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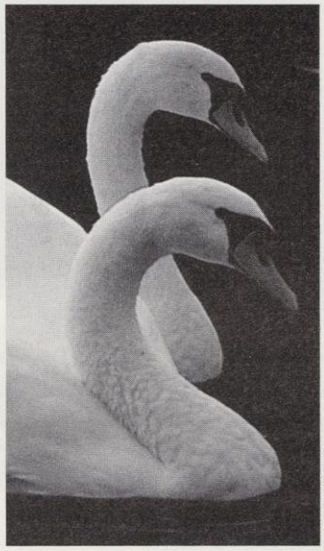
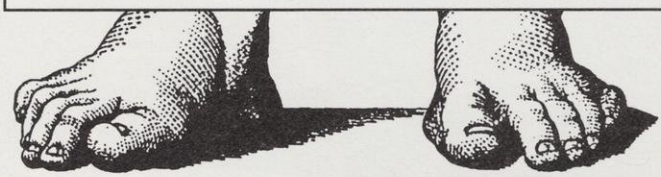


ARVID WIDVEY



ROBERT QUEEN

FRONT COVER: Coyote (*Canis latrans*).
HERBERT LANGE, HAZEL GREEN, WIS.

BACK COVER: Map of land use and cover types in Wisconsin. Map compiled from color infrared photography and panchromatic leaf-off photography taken between 1971-81 by the National High Altitude Photography Program. Information from United States Geological Survey's Land Use Data Analysis - Geographic Information Retrieval Analysis. DNR GEO SERVICES SECTION

Winter wren (*Troglodyte troglodyte*). JAMES D. YOUNG WILDERNESS PHOTOGRAPHY
(*inset*) Wintergreen (*Gaultheria procumbens*). VIRGINIA KLINE

DECEPTIVE

e l e g a n c e

Mute swans colonize ponds and parks so successfully that wildlife managers are investigating whether these graceful birds displace native waterfowl.

Tom Smith

Mute Swan ARVID WIDVEY

TUNDRA SWANS HERBERT LANGE

TRUMPETER SWAN HERBERT LANGE

Without a doubt, swans are among the most widely recognized and admired birds in the world. Their large size, dazzling white plumage, gentle grace and beauty have attracted people for centuries. We've cultivated a taste and an interest in building up swan populations, but they are not all native to Wisconsin, and they're not all compatible with native birds.

Three of the world's seven swan species can be seen here.

The most abundant, the tundra or whistling swan (*Cygnus columbianus*) breeds in the Arctic, migrates through Wisconsin, and winters on the Atlantic Coast. We see and hear them often during the spring migration and less frequently in fall.

Our native breeding swan, the trumpeter (*Cygnus buccinator*), is North America's largest native waterfowl, weighing 21-30 pounds and standing four feet tall. Its beak is pinkish at birth, then turns solid black during the first winter. Trumpeters are taller than tundra swans and have a loud, deep, resonant call compared to the higher-pitched "honk" of the

tundra. We suspect the snow-white trumpeters were never common here, but we're working with university researchers, citizens, industries, businesses and conservation groups to restore breeding populations of trumpeters.

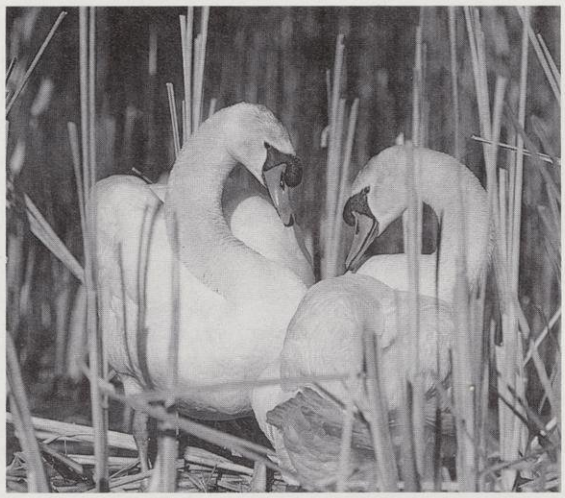
By contrast, there's little doubt of the success of a nonresident swan, the mute (*Cygnus olor*). That's the swan you usually see paddling around city ponds or waddling around animal displays. Mute swans have bright orange-red bills and the adult males have a prominent black knob connecting the top of the bill to the forehead. Mutes hold their necks in a characteristic S-curve with their bills pointed down.

Contrary to their billing, mutes are not silent. In fact they have a wide range of soft, honk-like notes. Young birds have a rather high-pitched piping call. Old birds hiss loudly when threatened. Their wings make a whistling sound when the swans fly.

Though exotic to this area, mute swans are common breeding residents in many Wisconsin counties. They are especially abundant in Waukesha County and other southeastern counties; there's a smaller flock in Ashland County to the northwest as well. It's unclear if these swans wandered in from other states or escaped from captive flocks.

Mute swans are Old World birds that breed in the wild in northern Europe and parts of Asia. In Great Britain, mute swans have been kept in domestic pens or semi-domestic flocks for centuries. Their close association with the aristocracy saved them from extirpation. Swans were heralded in legend, lore and history. Many of the mutes in England are true blue bloods whose ancestry can be traced at least 700 years. The mute swans we find in Wisconsin are so acclimated to contact with people that it's likely these birds originated from the British Isles stock.

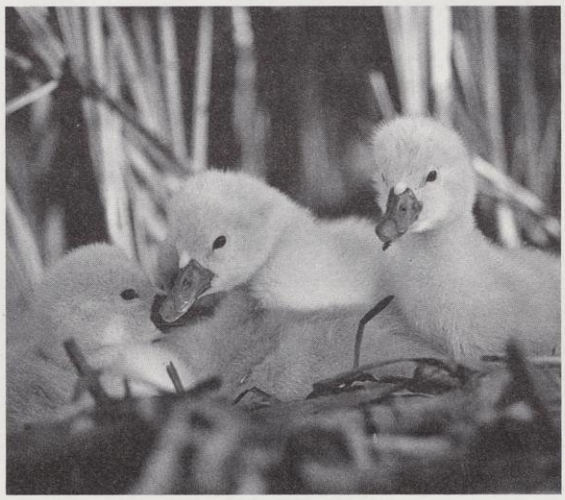
Our attitudes about mute swans are steeped in religious symbols, chastity, beauty and elegance. As we now consider steps to control mute swans as "alien" species, we'd do well to remember that most mute swans in the North America are feral, rather than wild birds. They are descended from domestic flocks that were raised for food. Cygnets were raised in special swan pits and fattened on barley. The custom still survives in England, to a limited degree.



STEPHEN J. LANG

Mute swans may defend territory to protect food supplies and nesting habitat for two years before they actually breed.

Populations of mute swans along the East Coast are growing by 30 percent a year and compete with native wildlife.



NEAL NIEMUTH

The English developed an elaborate system of marking birds and maintaining a swan-roll of ownership. Swan-marks could be inherited, willed or sold. Distinctive swan-marks were owned by individuals, colleges, hospitals, religious orders, towns, officials, guilds and manors as well as commercial companies.

Their large size and ease of capture made swans a customary pièce de résistance of European weddings, feasts and other celebrations. Christmas dinner meant swan or goose long before turkeys were introduced from North America.

Swan biology

Mute swans are typically solitary nesters with strong territorial instincts. In Wisconsin they compete for the same prime habitat as other nesting waterfowl — lakes and ponds with marshy shores, and wetlands adjoining rivers. In one unusual situation in Waukesha County, mute swans have formed a dense colony of nests. We suspect this flock is descended from domestic English birds as they are tame and extremely tolerant of people.

Most mute swans don't breed until they are four years old. Some pairs will establish and defend a territory for two years or more before they breed. Territorial defense may serve to stake out and secure a food supply as much as protect prime nesting sites. Swans eat large quantities of common water plants including waterweed (*Elodea*), pondweed (*Potamogeton*), water buttercup or crowfoot (*Ranunculus)* and water milfoil (*Myriophyllum*).

The build-up of mute swans in urban parks is largely unstudied. Researchers speculate that swan flocks consume so much vegetation that other animals, like muskrats, fish, other waterfowl or aquatic insects move elsewhere. It's also unclear how important supplemental feeding by people during cold weather affects swans' winter survival. It is clear that swan territories tend to be smaller in areas with abundant food supplies.

Swan nests are large affairs constructed of cattails, sticks and other vegetation, often built on top of muskrat houses. The average clutch size is six eggs. Once the last egg is laid, the clutch is incubated for 35 days. Newborn cygnets are indeed gawky (Remember *The Ugly Duckling*?) and covered with gray

Wildlife managers are concerned that native swans, like these tundras, may be displaced by the exotic mute swans that compete for the same habitat. Mute swans each eat about nine pounds of vegetation a day.

down. Young birds are dingy gray and don't grow their beautiful white plumage until they're more than a year old. Until the cygnets learn to fly, at about four months of age, they stay with adults. Once they have their wings, cygnets associate more with other young swans and the family unit starts to break down. By the next breeding season, all family ties are severed.

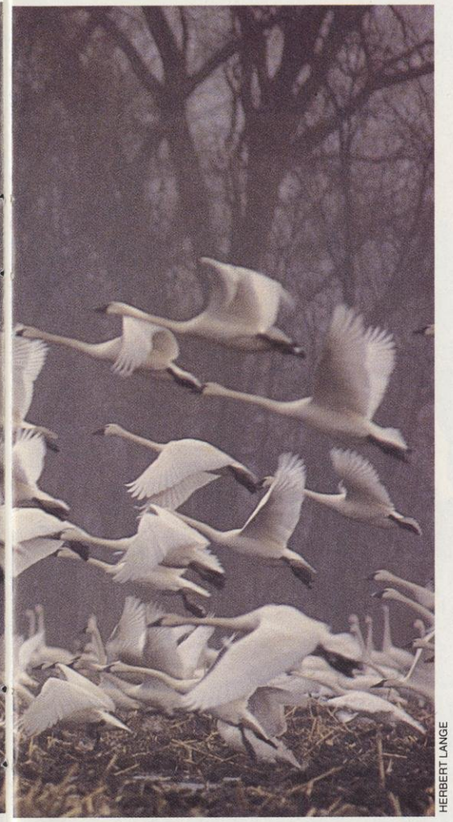
Cygnets must fend off natural predators and not-so-natural obstacles. Young swans fall prey to snapping turtles, raccoons and, reputedly, northern pike. Bad weather claims young cygnets, too. In Britain, collisions with overhead wires and outbreaks of diseases like botulism and aspergillosis claim swans of flying age. As in the United States, many mute swans in Britain die from lead poisoning. The major source across The Pond? Split shot and other lead fishing weights. Deaths from lead poisoning in Wisconsin haven't been investigated.

Most swans tough it out in Wisconsin during winter as long as open water is available. In severe weather, marked birds have been spotted in Illinois, Missouri, Michigan and Indiana.

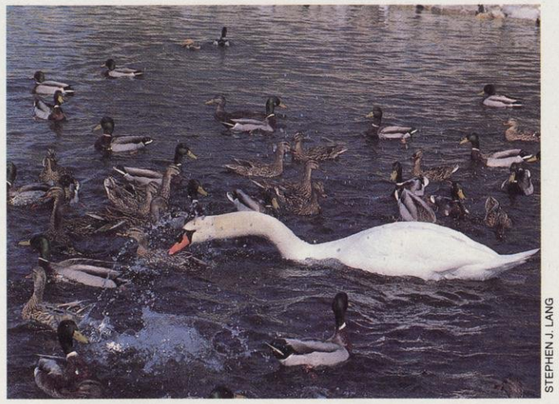
Why wildlife biologists are keeping a swan watch

Mute swans were introduced into the United States in the late 1800s. The current Atlantic Coast flock likely escaped from flocks imported by wealthy immigrants. An estimated 216 mute swans were released along the Hudson River in New York in 1910; 328 birds were brought to Long Island in 1912. This was the same era when Europeans freely imported such Old World pests as house sparrows, starlings and carp to this country.

By cutting flight feathers, many pinioned pairs of mute swans never strayed from urban parks, but their free-flying offspring created feral flocks that took wing, spreading the mute swan's territories. Mute swan populations are concentrated in New York, Connecticut, Rhode Island, Michigan, Minnesota and Illinois in addition to Wisconsin. Atlantic Coast flocks now number about 10,000 birds and are growing at an astounding rate of 30 percent a year. The rapid growth concerns wildlife biologists, ornithologists and naturalists. Avid bird supporters like the Audubon Society have written wildlife managers in support of controlling these growing populations. Part of the society's position reads: "The Audubon Society was formed ... to promote the conservation of native wildlife and wildlife habitat. One of the major threats to native wildlife is competition from introduced species. Audubon, therefore, supports the control...of the mute swan, which threatens certain populations of native waterfowl."



HERBERT LANGE



STEPHEN J. LANG

Swans get aggressive when nesting. They will chase off other waterfowl, dogs and people.

While a pair of mute swans may be seen as cute and pretty, large numbers of birds eating large amounts of aquatic vegetation can drastically change wetland wildlife and the marshes themselves. Mute swans eat about nine pounds of vegetation a day, even more in icy weather. Removing this much plant life considerably cuts habitat and food resources for native waterfowl, fish and other aquatic life.

The effects are even more direct during the spring breeding season. Mute swans will chase, displace or kill other waterfowl that try to nest in the same area. The aggressive swans have killed larger animals, including dogs, that wandered too close to their nests. It's doubtful that trumpeter swans could be re-introduced in areas frequented by mute swans.

It's hard to imagine that the delicate creatures nibbling crusts of bread from your children's hands could be harmful. During their aggressive breeding period, however, mute swans have attacked children, boaters and swimmers. Their powerful wings, strong beaks and legs are certainly capable of breaking bones.

Then there's the "attack" from the rear. Bacterial contamination from swans or any other waterfowl raise concerns where large numbers of birds congregate. Fecal material, which swans and other waterfowl produce in abundance, can spread disease and foul beaches, lawns and piers with unhealthy bacteria. Runoff that carries feces into the water can make lakefronts temporarily unfit for swimming, water-skiing, fishing and other water recreation. Feces also carry pathogens that can cause outbreaks of avian cholera, avian tuberculosis and salmonella.

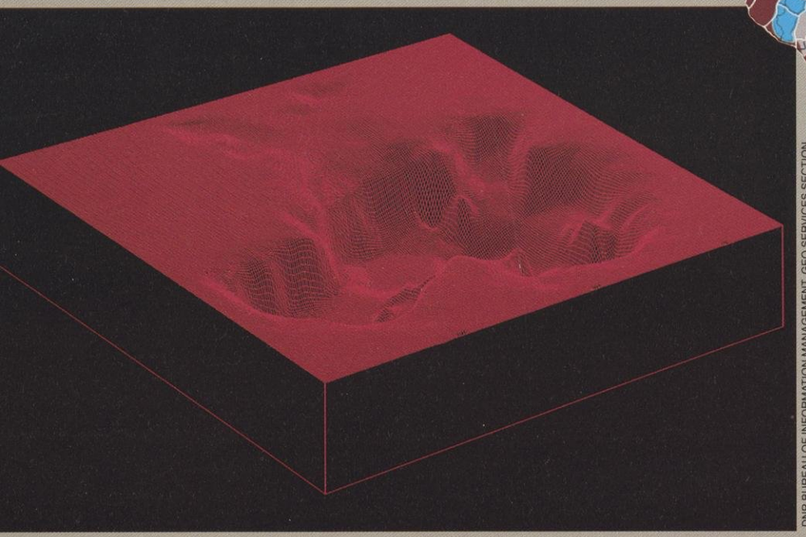
Anytime people introduce an exotic species to a new area, they change the local ecosystem, and the odds are it's a change for the worse. Of the many exotic species intentionally introduced to North America, very few, like the Chinese ring-necked pheasant and the German brown trout, have proven to be beneficial. The vast majority have caused significant social, environmental and economic damage.

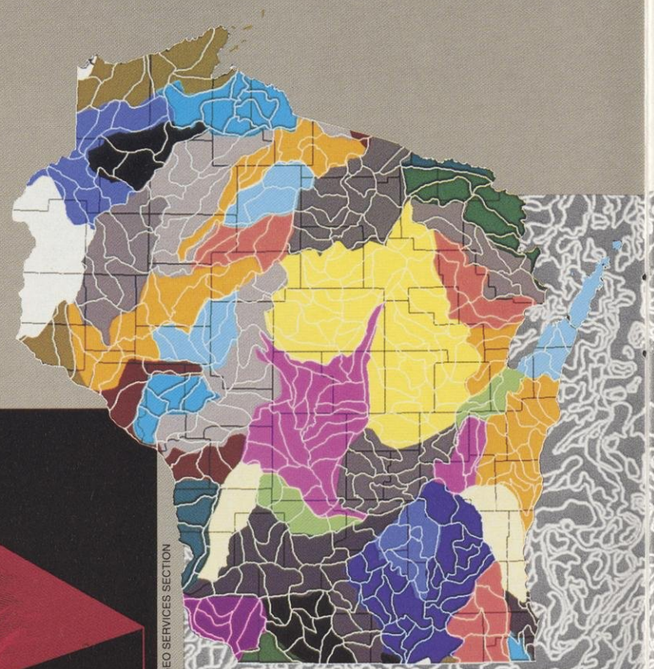
Purple loosestrife, water hyacinth, the house finch, carp, and English sparrows all caused damage by displacing native species before reaching some equilibrium with their new environment. Whether the mute swan is the source of similar disruptions is unknown and untested. The odds are good. In spite of its attractiveness, the mute swan is an alien organism that competes with native species for limited resources.

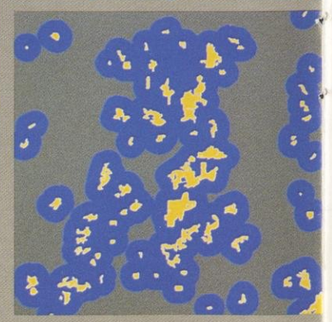
Problems are widespread and severe enough that several eastern states have started controlling mute swan numbers. A six-year study of feral mute swans in Rhode Island concluded that flocks had to be controlled.

The Department of Natural Resources is starting to track where mute swan populations are building up and how congregated swans affect habitat, plant life and native waterfowl. Reports of mute swans showing aggressive behavior toward children and pets will also be tallied. Currently mute swans are afforded the same protection as our native tundra and trumpeter swans. Educational programs remind us that all animals and plants have a natural niche, but concentrations of exotic species, even those as lovely and graceful as mute swans, can upset the natural diversity that sustains both the wild world we received and the wild legacy we leave. □

Tom Smith is a former DNR wildlife specialist.







A sampler of GIS applications:

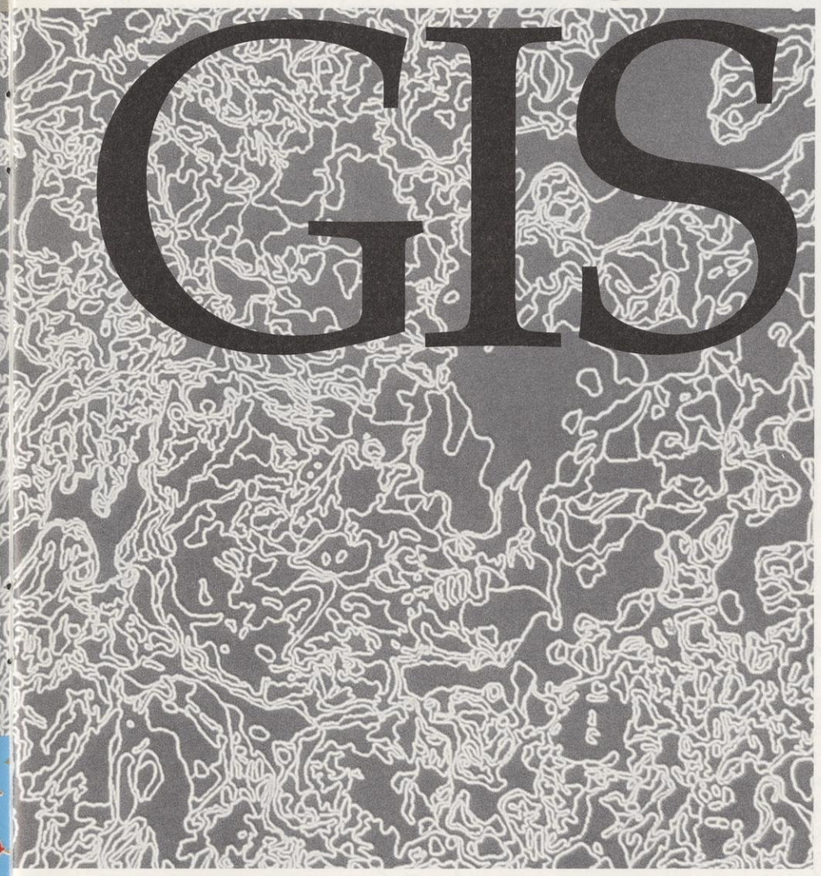
(*clockwise from top*)
Natural drainage areas surrounding river basins.

Soil types in Fond du Lac County.

Pheasant, duck and optimal nesting cover in portions of the Glacial Habitat Restoration Area.

A 3-D depth model for Madison's Lake Mendota.

Getting the GIS t



Geographic information systems begin by showing users where things are, but their real value becomes apparent as who, what, when and why are revealed as well.

Maureen Mecozzi

Ask Brad Duncan to name the three most important words in his field and he will undoubtedly reply: "Location, location, location."

No, Duncan's not in real estate or fast food. His business is information. Geographic information, to be precise. For Duncan and his colleagues in the GEO Services Section of DNR's Bureau of Information Management, there's a place for everything, and everything — whether it's a wetland, a watershed, your well, or a timber wolf — has its place.

This simple piece of wisdom underpins DNR's geographic information system, or GIS, which uses computers to make sense of seemingly unrelated pieces of data pinpointing where things are located. In a GIS, things that once appeared to have no connection suddenly take on relationships no one ever suspected they might have. And that, says Team GEO, is like learning to see after years of being blind.

X marks the spot

Think of geography and it's likely an image of a map will pop into your mind. Maps have helped people visualize the relative location of places for centuries. What standard maps don't do, though, is tell much about the other aspects of geography — the interactions of land, people, plants, animals and climate across the vast and intricate web of life on earth.

"That's precisely what we need to know to make decisions about managing and preserving natural resources today," Duncan says. "This is where a GIS excels."

That's because a GIS is a large computer database holding files of millions of pieces of data from different sources with one thing in common: Each piece can be identified according to its location or position on the globe. And, as any cartographer will tell you, as long as you know where something is, it can be mapped, referenced or interrelated

with other data.

One of DNR's first forays into a GIS was to answer this question: How susceptible is the state's groundwater to contamination?

DNR and Wisconsin Geological and Natural History Survey researchers pulled data from various agencies on the depth to bedrock, the type of bedrock, soil characteristics, depth to the water table, and the surface geology, then combined it all into one map, breaking down the state by color into "levels of vulnerability". The map showed the areas that would require closer attention to pesticide and fertilizer application and other potential sources of groundwater contamination.

As Jim Cory, a GIS technical support specialist, says: "Words are fine, but when you actually see something, it means more."

Consider the Glacial Habitat Restoration Area, a recent project embarked upon by DNR wildlife managers and researchers to restore grassland and wetland habitat for 14 species of birds, including bobolink, western meadowlark, pheasant and blue-winged teal across more than half a million acres in parts of Columbia, Dodge, Fond du Lac and Winnebago counties.

"That's a lot of ground to cover," says Ron Gatti, wetland wildlife biologist in DNR's Bureau of Research. "We're using a GIS to find the optimum spots to restore and protect."

To create a habitat model, Gatti and his colleagues have been assembling a variety of data layers:

— digitized satellite imagery of the area

— two wetland maps, one produced by the Department of Natural Resources and the other by the Soil Conservation Service

— soils maps, including one indicating where wet soils are and one showing extremely dry, coarse soils

— land parcels, with owners' names and addresses from county tax rolls

— archeological and historic sites from the State Historical Society

— land placed in federal set-aside programs from the Agricultural Stabilization and Conservation Service

— location of rare plants and animals from DNR's Natural Heritage Inventory

— locations of existing areas of good habitat or thriving bird populations

— roads, lakes, rivers and streams

— historic land cover, compiled from information gathered in the 1830s from early surveyor's records and in the 1930s by the Wisconsin Land Economic Inventory.

As the data is entered into the GIS, researchers can begin manipulating and layering the information to get their questions answered. "The places with wet soils were once wetlands," Gatti says. "Those are the sites where we want to concentrate our wetland restoration efforts. Are the sites being farmed now? Are any in short-term set-aside programs? Where are they in proximity to existing wetlands, to any native burial mounds, to a blue-winged teal population? We start comparing the layers.

"Maybe there's an existing wet meadow we'd like to flood for a duck brooding area. But when we look at a wetlands map overlaid by the Natural Heritage Inventory layer, we discover there's already a rare orchid species in that wetland that we need to protect."

All these bits of knowledge — what's where, how much of it is there, what it's next to, and so on — will guide researchers in locating the areas of greatest value for a particular species or purpose. When the areas are pinpointed, the landowner is contacted to see if he or she would be willing to participate in the program or grant the Department an easement on the property.

"The goal is to create a patchwork of good habitats in the larger agricultural landscape," says Gatti. "With GIS maps, we can show people how much the land — their land — has changed over time. It's a powerful tool."

GIS is helping a team of DNR wolf researchers and Department of Transportation planners evaluate the impact of a highway expansion in northwest Wisconsin on wolves. The team will plot the wolf pack's migration patterns and overlay them on satellite images of the existing land cover; the proposed highway routes will be added to see which one would interfere the least with the wolves' habits and habitat. To protect the sensitive, highly productive marshlands in the La Crosse River valley, DNR and DOT teamed up again with a GIS to determine the best route for a highway and other future development. And GIS maps of increased population growth and agricultural land use in the Fox Valley — part of the Lake Michigan basin — may someday help redefine the jurisdiction of the Coastal Zone Management Commission, which currently extends only over counties with Great Lakes shoreline.

Getting it all down on computer

A GIS has the voracious appetite of a trained seal: The more you feed it, the better it performs.

Coming up with the right kind of chow, though, tests the skill and patience of cartographers, computer specialists, researchers and record-keepers from every possible avenue of human measurement.

"It's not that the data's not out there," Duncan observes. "It's just that it's in different forms — in words, in numbers, in pictures. Most of it was collected for a single purpose; it was never intended to be cross-referenced with anything else."

Using a computer mouse or puck, cartographers can trace rivers, roads, survey lines and other features from existing maps into a GIS. But the GIS computer doesn't store the actual pictures. Rather, it holds a digital file of latitude, longitude and other geographic coordinates all along those rivers and roads, which can then be called up to reproduce the features on screen or in a map, alone or in conjunction with other digital files. Elevation coordinates may be added if a three-dimensional representation is desired.

Paper maps come in all scales, sizes and projections, depending on what's being illustrated. A plat map showing property ownership map might be drawn at a different scale than a soils map, for instance. GIS operators must make sure data collected from one map will register, or fit, with data collected

from other maps. The age-old cartographic conundrum of faithfully representing a curved surface on a flat plane is one that technology continually tries to master. "Sometimes I think we'd be better off if the earth *was* flat," Duncan laughs. "It'd save us a lot of time."

Digital coordinates are also used in a GIS to represent the locations of everything from cheese factories, rainfall measurements and leaking underground storage tanks to rock strata and rabbit populations.

Data capture — putting information into the system — claims about 70 percent of the time and money spent on most GIS projects. But a file need only be put in once, with periodic updates to keep it current. It is then available for other purposes and users.

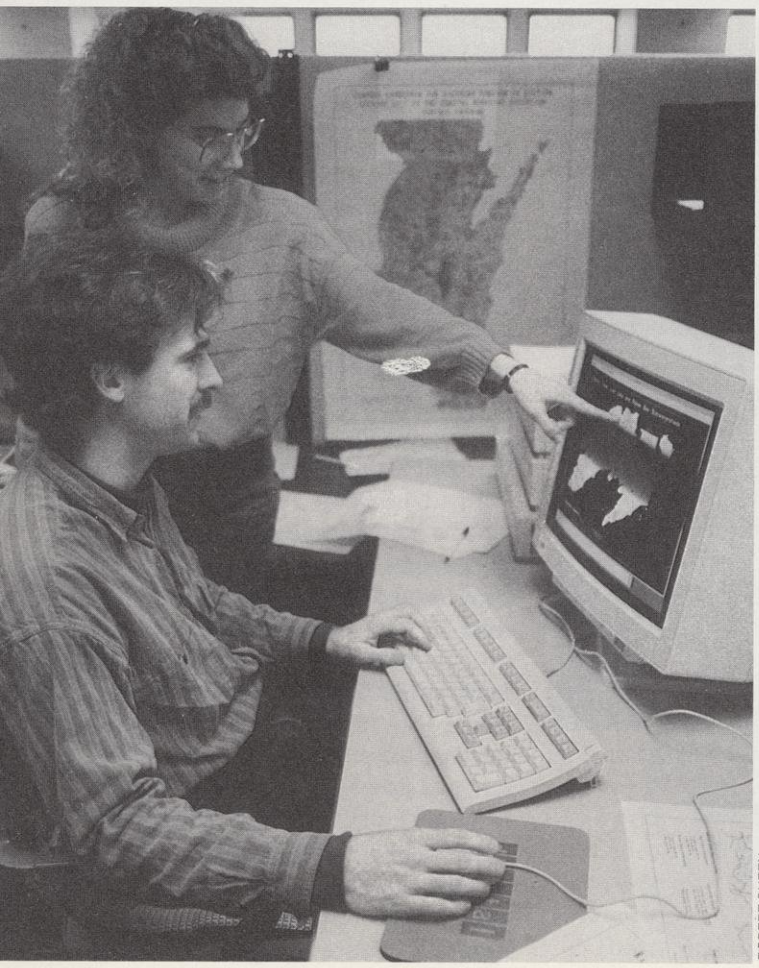
Gale Yoerger, a geographic project manager in the GEO Services Section, is well-acquainted with the agony and, if not the ecstasy, the satisfaction of creating a mammoth GIS file of the state's 332 watersheds.

"Staff in our water resources program needed the watershed map to develop plans to stem nonpoint source pollution — the runoff from fields, farms, streets and lawns," she recalled. "Looking at the problem from a watershed standpoint would give the most accurate picture."

Starting in 1989, the outline of each watershed was painstakingly traced from existing topographic maps with a hand-held computer mouse. It took about 18 months to collect all the coordinates.

"But now that we've got it in the GIS system, it's been incredibly valuable," she notes. "It's been used to get a better handle on phosphorus loading in surface waters across the state. We've used it as the base for river basin planning. We can overlay the locations of leaking underground storage tanks, wells with high nitrate levels, groundwater recharge zones and pesticide mixing sites to see where the vulnerable sites are within a basin. We've used it on a larger regional scale.

Janet Sausen and Tom Simmons, two of the GIS cartographers who correlate diverse information about precise locations.



ROBERT QUEEN

"What the GIS does is give us the ability to understand issues very early in the planning stage, find out where a problem is the most critical, and project future scenarios," Yoerger says. "We can query the system and see what consequences different actions or solutions might have. What would happen to the water table if a landfill were sited here instead of there? How many barnyards are there between this wetland and that town well? Where is the problem the worst, so resources can be focused there first? Those are the kinds of questions we can ask and have answered visually and immediately."

Despite the emphasis on visuals, proponents of the "1,000 words are worth one picture" school won't be disappointed by a GIS. Data — area, volume, length, width, height, dates, population, times, distances, names, slopes, income, material composition, you-name-it — can also be called up on-screen in written form by pointing to a specific map location with a mouse. It's an electronic encyclopedia of the earth.

Shared around the world?

Geographic information systems represent an unprecedented opportunity for cooperation among all our governmental, educational and societal institutions, whether local or statewide, national or international, public or private. By sharing data gathered for their own purposes in a GIS, they give to each other — and to the citizens they serve — the pieces to solving some complex riddles of human activity on the planet.

On a more mundane level, a GIS is a smarter, faster, more cost-effective way to go about the business of setting priorities, establishing policies, and making tough decisions at a time when funds and resources are stretched thin.

Brad Duncan acknowledges that buying the equipment and building the database for a GIS is costly. But the consequences of not using a GIS have a price as well.

"There's whole lot of data out there, and there's more gathered every day," he says. "The question is, do we want data, or do we want information that makes sense? It's information we can't afford not to have." □

Maureen Mecozzi is associate editor of Wisconsin Natural Resources.

Furbearers of the Northwoods

STEPHEN J. LANG

Chet Botwinski

The coyote (*Canis latrans*), commonly called the "brush wolf," is the most abundant large predator in Wisconsin. It's often mistaken for its larger, endangered cousin, the eastern timber wolf, but the two have distinct features and living habits. Coyotes are very adaptable and are found in nearly every region of the state. They prefer habitat where forests and scattered development intermingle — near farms, homes and towns. In contrast, wolves prefer the isolation of wilderness and deep woods.

Physically, the coyote's silhouette looks similar to a German shepherd. The coyote's bushy, black-tipped tail is carried in a drooping fashion. Its fur is generally mixed gray or pale reddish brown on the back and sides. A coyote has a pointed muzzle, erect pointed ears and piercing yellow eyes. Its tracks are fox-like but larger. The coyote track is also more pointed as the center toe pad is very prominent. Unlike a dog, coyote tracks fall in a very straight line.

Most Wisconsin coyotes range in size from 25-40 pounds, although they appear larger in the wild. Coyotes have exceptional senses of sight, smell and hearing, along with keen "sixth" senses that enable them to live close to people without detection.

You can improve your odds of seeing coyotes by knowing what signs to look for and understanding how they live.

In northern Wisconsin, coyotes travel freely within a four- to eight- mile home range. Family groups remain together through early winter when snows are not too deep. Look for tracks along wooded trails. Although coyotes are much more vocal during late summer and fall, one can hear their calls on calm winter evenings as the last rays of light fade. This evening call is neither a

HERBERT LANGE

slow nor fast *yip-yip-yip-owoo*, rising from low to high notes and dropping off mournfully at the end. The coyote is saying "I'm here, where are yoooooou?" To the untrained ear, two or three coyotes singing in a chorus often sound like a dozen animals.

By the onset of breeding season in late January and February, coyote pups from the previous year disperse, moving 15-30 miles from their home area. Some move more than 50 miles. Once dispersed, the coyote pups are loners as yearlings. They typically won't mate or breed until they're two. Then, coyotes settle down and form regular territories of their own.

During deep snows in late winter, tough traveling conditions restrict their home ranges. Coyotes often shift to find areas where the snow isn't quite so deep. During these deep snow periods, look for coyotes along snow-crusted lakeshores, frozen creeks, near beaver ponds and close to deer yards. Coyotes will consistently use well-tramped deer trails for easy travel and will hunt for weak, dying or dead deer.

You may also see coyotes near den sites. The dens are secluded but often have a south-facing entrance on a knoll near a creek or beaver pond. A quality den site will be reused for years unless it is disturbed by humans or other animals.

ALL MAPS BY LISBETH QUADE

Pups conceived in February are born during April. Litters of five or six coyotes are common. For their first two months, the pups are closely watched and the female won't wander far in search of food. The male regularly brings food back to the den.

By late summer and early fall, the pups will freely wander within a two- to three-square mile range. Although the pups are near adult size, they are less wary of people. You're most likely to see and hear coyotes during this season. They are very vocal at sunset and sunrise. Look for coyote tracks along old roads, trails and sandy spots. They feed in low light on meadow edges where the young ones can scavenge berries and other wild fruits or prey on mice and frogs. □

Chet Botwinski oversees wildlife management activities in Vilas, Oneida and Forest counties from DNR's Woodruff Area Office.

EASTERN TIMBER WOLF

Adrian P. Wydeven

The oval opening extends five to 15 feet into a sloping hillside. Toward the back, a tunnel expands to form an enlarged chamber, a den where an eastern timber wolf (*Canis lupus lycaon*) delivers five to seven pups. It's late April, and the den is hidden in a heavy cover of conifers and hardwoods near some open water.

April marks the end of the wolf pack's nomadic period. Once the dominant female begins spending time preparing a den, the other five or so wolves in the pack radiate out to forage for food, especially beaver and deer. The female may excavate her own den or may merely enlarge burrows abandoned by woodchucks or foxes. Wolves will also build den sites in hollow logs, old beaver lodges, hollow trees or rock caves.

During the winter, the pack consisted of an adult pair, their offspring from current and previous years and, occasionally, other adults not closely related to pack members. They traveled together, roaming the territory for deer. No regular home sites were maintained during the winter, but the pack often lingered several days at a kill site.

Once the pups are old enough to remain outside the den, they will be moved to a rendezvous site in late June. This open area of grasses and sedges near open water provides safety for the summer while the rest of the pack hunts. Rendezvous areas are typically surrounded by thick stands of black spruce, alders and conifers. They form dense, protective cover for the young pups. Occasionally, an adult may stay with the pups, but most often they fend for themselves safeguarded in this area. By mid-September the rendezvous site is abandoned and pups begin traveling with the rest of the pack.

There are so few timber wolves in Wisconsin (about 50 individuals in 13

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Continued from page 16

packs) and they are so elusive, you are unlikely to see one. You stand a much better chance of seeing wolf tracks, finding other signs of their activity or hearing the pack call. If you're traveling in wolf country, drive along the back roads and forest roads in remote areas either a day or two after fresh snow or a few days after rainfall. Several field guides and DNR fact sheets illustrate wolf tracks. Look for large dog-like tracks at least four inches long traveling in a straight line. Dogs tend to meander more so their tracks zigzag a bit.

Following wolf tracks in the snow can be a fascinating winter sport, but take precautions. Avoid following the pack's direction of travel for long distances as you could disrupt normal wolf behavior. The pack could be stressed by constant following. It's better to backtrack and examine where wolves have been. You might find an old kill site or see signs of their behavior without disturbing the pack.

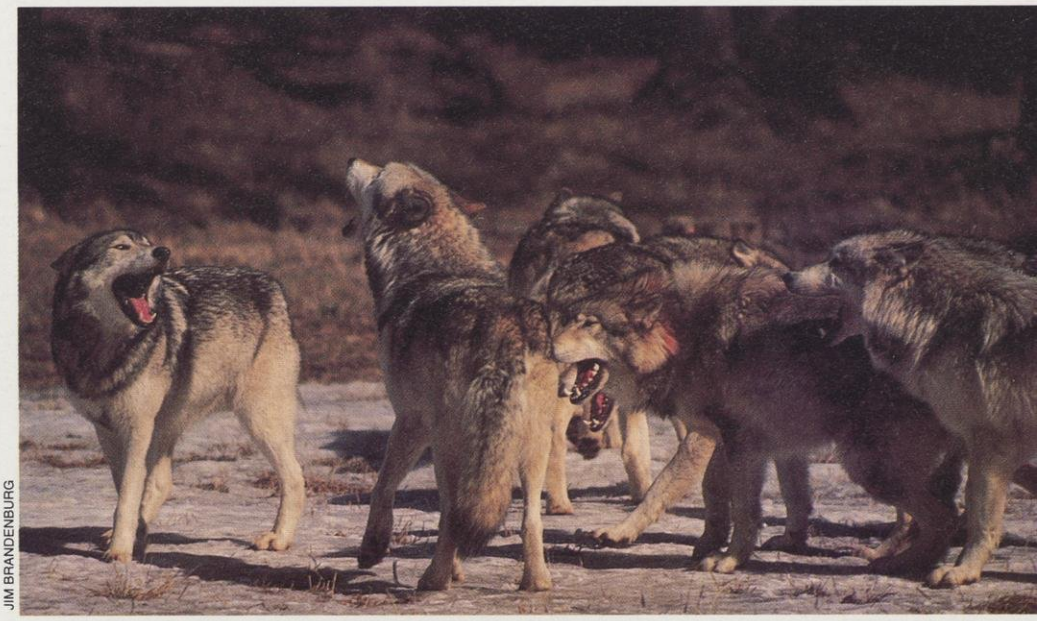
You can also learn about the pack by observing their urination patterns in snow. Subordinate, nonbreeding wolves normally urinate in a squat position like female dogs right along their tracks. Breeding wolves (both males and females) raise their legs and urinate like male dogs on raised objects or snowbanks. In January and February, urine may be stained with drops of blood as female wolves enter estrus.

Also look for scats at least an inch in diameter that contain mainly deer hair or beaver fur. Coyote scats are smaller and bear scats are less cylindrical and contain undigested plant matter. Never handle animal scats to prevent the spread of disease.

Another way to enjoy wild wolves is by howling. Wolves respond to human howl imitations, especially in summer when the pack howls more often to keep in touch with pups at rendezvous sites. Travel back roads in remote wolf country at night. Get out of the car every mile or two to howl. Organizations like the Timber Wolf Alliance and the Timber Wolf Information Network regularly teach people how to howl. Their workshops also teach respect for these rare wild mammals. For instance, you'll learn not to howl in April and May to avoid stressing wolves with young pups. Also, don't howl near a pack's known rendezvous site for the same reason.

The Department of Natural Resources presently monitors timber wolf populations by live trapping and radio-collaring individuals, then following their subsequent movements. Howling surveys and winter track surveys help form estimates of pack numbers, sizes and locations. The departments of Natural Resources and Transportation along with UW-Stevens Point, U.S. Fish and Wildlife Service and Minnesota DNR are also conducting a cooperative study of wolves in northwest Wisconsin to determine ways to minimize adverse effects of highway development on wolf movements and activity. □

Adrian P. Wydeven is a DNR nongame biologist stationed in Park Falls, Wis.



JIM BRANDENBURG

PUPS NEAR A RENDEZVOUS SITE. JIM BRANDENBURG

JIM BRANDENBURG

RED FOX

GREGORY K. SCOTT

Jim Hoefler

Driving along a back road past farm fields, something darts in front of your car so fast you don't have time to focus on it. As it speeds across the field, you see a blur of orange color and a long, bushy tail. It stops at the far end of a row and looks back at you. There is no mistaking it now — red/orange color, white tip on the tail, black lower legs and feet. You've just seen a red fox (*Vulpes vulpes*).

This particular red fox has lived in this area for four years. He and his mate occupy approximately the same territory, but red foxes are solitary animals that like their space.

This pair first encountered one another three years ago on a hill overlooking a marsh. Each year since they have raised a litter of pups on the same hillside. In fall, once the pups are old enough to fend for themselves, the adult pair split up. For months they will cross each other's tracks often and see each other several times, but they apparently have little urge to stay together.

By January, something draws them back together. They will meet, nuzzle and travel together for the next few months renewing their pair bond.

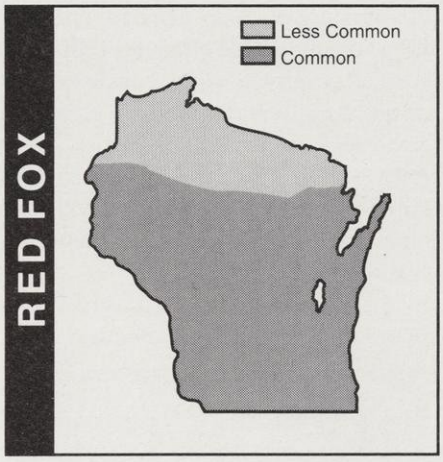
In March the vixen searches for a den to give birth and raise the young. These foxes have used four different dens in the past three years. Last year

HERBERT LANGE

they moved the den twice when disturbed by farm machinery and people. This year she selects an old woodchuck burrow along a fence line. It's on a hillside where she can watch for danger when the pups are old enough to romp outside the den. The vixen will spend several days enlarging the den to accommodate herself and her young.

In April, she gives birth to five pups. The adult male is no longer allowed in the den. He spends most of his time hunting and bringing her food daily. Once the pups open their eyes, at about nine days, the vixen will take her own hunting trips while the male watches the youngsters.

Each adult fox hunts on its own and brings back prey for the young. It's good training for the pups to learn the sight, smell and feel of their prey. The pups also gain agility and strength tugging on bits of fur and play-fighting with their siblings. As the pups grow older, they accompany adults on hunting forays and learn how to capture their own quarry.



By the end of summer, the pups are hunting on their own. They will claim their own territories and, perhaps, raise a litter within view of the marsh.

The red fox is found throughout Wisconsin. Nearly every large farm has a resident pair. Foxes are especially common in areas with a mixture of farm fields, woodlots, overgrown brushy areas, fence rows and pastures.

The expression "sly as a fox" is applicable as foxes are both wary and difficult to observe. Their small dog-like tracks are easy to see in the snow. Paw prints are 1¾ inches long and spaced 10-11 inches apart. Fox tracks run in a straight line when the animal is traveling, but zigzag in and out of cover when the fox hunts. You may catch a glimpse of them at dusk, dawn or on moonlit nights. On bright winter days, look for foxes dozing in the sun along fence rows or on hay bales. □

Jim Hoefler is interpretive wildlife manager at DNR's Crex Meadows property in Granstburg.

MARY JO KEWLEY COURTESY OF GREAT LAKES INDIAN FISH AND WILDLIFE COMMISSION

Ron Eckstein

"Another fisher," said DNR Wildlife Technician Fred Johnson. Fred recognized the track in the fresh snow without even getting out of the truck. Fred and I were estimating winter predator populations by counting every animal track that crossed a 10-mile stretch of road in the Nicolet National Forest.

In Wisconsin's northern forest, fisher tracks are now a common sight, but it wasn't always so. Logging and wildfire at the turn of the century, combined with unregulated trapping, depleted populations of our largest woodland weasel. The last native fisher (*Martens pennati*) recorded in Wisconsin was killed in 1932.

By the 1950s, the northern forests were rebounding. Young forests were forming dense tree canopies. Extensive open barrens were being reforested and effective fire controls prevented wildfires. New laws and an increasing force of conservation wardens controlled illegal trapping. On March 8, 1957, State Game Manager Bernie Bradle released a fisher in the extensive "no trapping" refuge on established in the Nicolet. The fisher hit the ground running and disappeared into the dense forest.

Between 1957 and 1963 a total of 60 fishers were released in the Nicolet forest by Conservation Department and U.S. Forest Service officials. Their aim was to control a large population of porcupines then damaging white pine and hemlock stands. The fisher is the only predator that routinely kills porcupines. Subsequently, another 60 fishers were released in the Chequamegon National Forest during 1966 and 1967. By the time Bradle retired in 1970, fisher populations were established and naturally reproducing, but they had not extended their territories far from the release sites. Winter track counts in 1985 verified that the fisher population was spreading throughout the northern forest. Wildlife Researcher Bruce Kohn estimated a population of 6,000 animals by 1991, about one fisher for every 2½ square miles of forest range.

ROGER POWELL

Fred and I finished our track count and stopped at the Pine River Bridge for lunch. We had tallied three foxes, three coyotes, one otter, one pine marten and eight fishers along the 10-mile route. Although we've seen a lot of tracks over the years, we rarely see a fisher. Kohn, however sees lots of them. He's been conducting research and monitoring the population since 1976. Fishers were live-trapped and radio-collared to determine basic habits and travels.

Wisconsin fishers have black or very dark brown fur with silver-tipped hair on their head and shoulders. They have a typical weasel shape: long body, long fluffy tail, rounded short ears and short legs. The males are 30-40 inches long (including the tail) and weigh seven to 15 pounds. The females are about a third smaller and weigh only half as much.

Females choose a den high in a large tree cavity and give birth to two or three kits in March. The male does not help raise the kits. In fact, females only tolerate males during the mating season in late March and April. At about eight weeks of age, the kits are moved to a ground den. Kits remain with the female until late summer or early fall when they disperse to live solitary lives. Males have a nearly 15-mile range; females, about three miles.

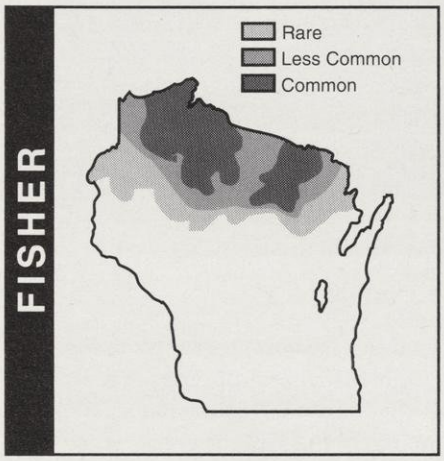
Fishers prefer heavily-shaded forests with mixtures of deciduous and coniferous trees. They especially use scattered, big, old den trees near young aspen forests.

Fishers are opportunistic predators that hunt on the ground. Aspen stands shelter their primary prey, snowshoe hares. Fishers will also eat porcupines, mice, chipmunks, squirrels, a variety of birds (including ruffed grouse) and bird eggs, various fruits, nuts and berries. Where available, fisher will con-

sume carrion, especially dead deer.

The densest fisher populations occur in the two tracts of the Nicolet and Chequamegon national forests specifically managed for these furbearers. Even there, the animal's nocturnal habits make observations difficult. You'll have better luck following a fresh set of tracks during the late March mating season. You might try setting up a blind near some carrion.

Research and management will ensure the fisher remains a part of



Wisconsin's northwoods. The Department of Natural Resources will continue to monitor fisher populations by comparing track counts and distribution in our northern forests. Trappers provide additional valuable information. Once a pelt is removed, the fisher carcass must be given to DNR researchers. The animal's sex, age and reproductive history are determined. The data becomes part of a model that estimates the population status. Another study by Jonathan Gilbert of the Great Lakes Indian Fish and Wildlife Commission is examining the interaction among fisher, pine marten and bobcat.

Fred recorded the odometer reading on our truck and we began the second leg of our survey route. In less than a quarter mile Fred slowed the truck, peered out the window at a track in the fresh snow and said "Another fisher."□

Ron Eckstein is a DNR wildlife biologist stationed in Rhinelander, Wis.


DNR PHOTO

PINE MARTEN

Adrian P. Wydeven

A solitary hunter hops and climbs its territory in search of a winter meal. The target? Oh, any small mammal will do, perhaps a juicy red-backed vole or a red squirrel.

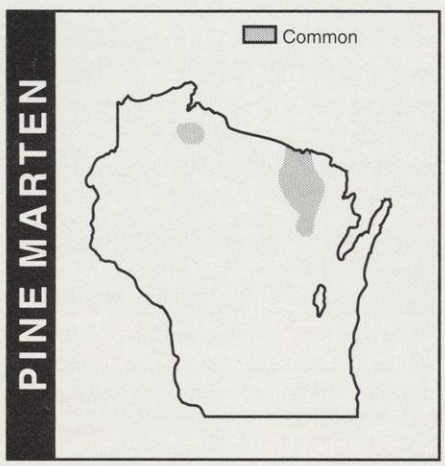
The small but spunky pine marten (*Martens americana*) cruises dense woodlands on quiet, padded paws. These woodland weasels weigh 1.5 to three pounds, and are six inches high and 18-25 inches long. One third of their length is a bushy tail. Soft, thick marten fur varies in color from yellowish buff to red or dark brown.

The pine marten has gotten a bad rap as a major hunter of red squirrels. Actually, it isn't so much the squirrel that the marten craves, it's their *homes!* The food caches that red squirrels prepare are favorite resting areas for pine martens because they provide excellent protection from winter cold. The cache, also called a midden, is a veritable insulated storehouse. It's an impressive pile of conifer cones packed two feet high and up to six feet across in a hollow tree, underground den or near the hidden base of a tree.

Hollow snags are important to pine martens throughout their lives. Females will select a large hemlock or one of the swamp conifers and build a den high up in a tree cavity. The den will be lined with grass, moss and leaves before she gives birth some time between mid-March and late April.

Spring is spent caring and providing for her offspring. The kits are moved to a ground den or hollow log at about seven to eight weeks of age.

The male plays no part whatsoever in raising the kits. In fact, the female also leaves the kits at about six months when they can travel on their own. By late summer the family unit breaks up. The juveniles will travel widely and won't establish territories until they are ready to breed at about 15 months. Adults occupy discrete territories which males defend. An adult male will al-



low several females in his three- to six-square mile home range.

In warmer weather, pine martens' diets are more varied. They'll eat bird eggs and berries, fish, crayfish, amphibians, reptiles and insects in addition to rodents, hares and squirrels.

Martens breed in July and August. Aside from their first six months, the short-term breeding bonds are the only social periods in the pine marten's solitary life.

Although the female gestates for 228-276 days, active pregnancy lasts only 27 days. Martens, like other weasels, have delayed implantation — the fertilized egg does not embed until the last month of gestation. This allows the female to breed in the summer when food is abundant and to avoid producing young during the harshest weather of the year.

Your chance of seeing a wild pine marten is limited due to their small population size, limited distribution and nocturnal habits. Your best chances are in the national forests where pine martens have been restocked — the northern portion of the Nicolet and the region north of Clam Lake in the Chequamegon. Look for mature, old growth conifer forests with nearby groups of hardwoods. Mixed stands of spruce-fir, hemlock-hardwoods, swamp conifers and cedar swamps are favored by pine martens. Even if you don't see a marten, look for their 1.6-inch tracks zigzagging and jumping along forest roads shortly after a fresh snowfall. Please don't obscure the tracks. DNR researchers may be driving the same roads surveying marten populations and movements.

A recovery plan for this endangered weasel aims to maintain at least 300 martens in the Nicolet forest and at least 100 martens in the Chequamegon forest. Between 1987-1990, funds from the endangered resources tax checkoff helped restock 139 martens near Clam Lake. Surveys started last winter track the comeback of this elusive woodland weasel. □

Adrian P. Wydeven is a DNR nongame biologist stationed in Park Falls, Wis.

BOBCAT

MARK S. WERNER

James E. Ashbrenner

Picture a crisp, clear winter morning just about daybreak. Ahead of you is a freshly snow-covered road, a white path that disappears into the tree line. You follow a small track proceeding straight down the road ahead of you as if the animal has a definite destination. You could very well be on the trail of a bobcat *(Lynx rufus)*.

Your chances of seeing a bobcat in the wild are slim. However, by staying one step behind them while the trail is warm, you can still learn a lot about them. Pick a winter day just after a fresh snowfall, preferably about a one-inch wet snow. Find a town road, trail, abandoned railroad grade or an old logging road that cuts into deep woods. Look for signs of animal tracks crossing or following the route. Tracks in the fresh snow are likely only minutes or hours old, silent calling cards of a nearby animal.

Adult bobcat tracks look like domestic cat prints, but they're about two inches in size. Look for a print that's more round than long with four bean-shaped toe prints and a three-lobed heel pad. Cat prints do not usually show claw or nail marks as the animal's claws are retracted unless the cat is climbing or walking on unsure footing. In summer, look for tracks on the edge of puddles and on wet sandy roads. You might also find droppings or scats near a road; bobcats will leave a few claw marks in the sand or debris when partially covering them.

The best time to observe bobcats is during the half light of dusk and dawn. You might see one feeding on a car-killed deer along a roadside or catch a glimpse of one along the edge of your headlights. Some people are lucky enough to spot one while sitting quietly in a deer hunting stand. If seeing a bobcat becomes as interesting as the hunt, you might want to set up a camouflage blind on nearby ground. Some people are skilled at attracting bobcats by mimicking distress calls of prey.

As winter snows deepen, both bobcats and their prey stay in dense stands of hemlock, fir, spruce and white cedar where the snow is less deep.

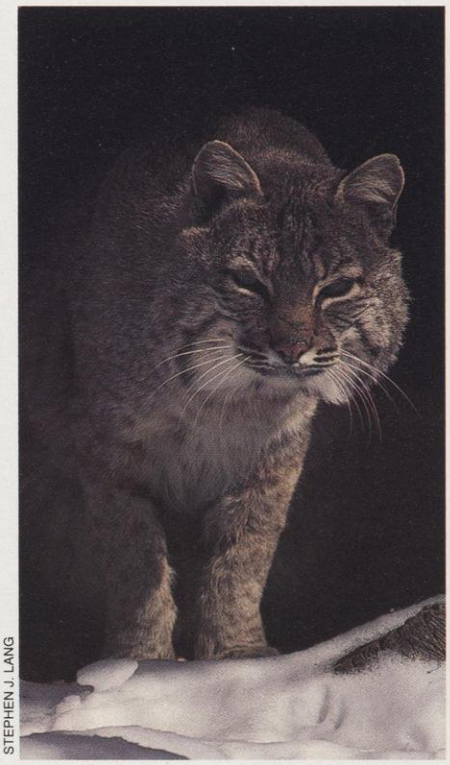
Bobcats have keen senses and hunt more by sight and sound than smell. Like all cats, they are extremely curious and will pause to inspect anything out of the ordinary. Bobcats occasionally climb up on high rock outcrops, stumps or angled trees to listen and observe their surroundings.

Food is scarce enough in winter that bobcats must be opportunists who will take prey anytime and anywhere.

Snowshoe hares are supplemented with mice and squirrels. Deer carrion is an especially welcome addition to their diet.

The bobcat's courtship begins in the long shadowy month of February and continues through March. The courtship is replete with playful ambushing, side stepping and body bumping. After mating, the female chooses a den site. The entrance is totally obscured from a distance. On close inspection, you might see a slightly indented path leading to a brush pile, hollow tree, rock pile, rocky crevice or another den abandoned by a beaver or fox. The female scratches leaves, moss, grass and other soft material to line the den site. She will gestate for 62 days as winter turns to spring. She gives birth to two or three 10 - 12-ounce kittens covered in fur. In about 10 days the kittens' eyes open. The kittens won't leave their den to explore their surroundings for four to five weeks. Then the growing kits need more than milk and the mother will leave for short forays for fresh meat. At first the kittens play with the food, but they soon overcome their shyness and you'll hear low growls as they claim their share of the meal. In a short time, the kittens are hunting and fending for themselves.

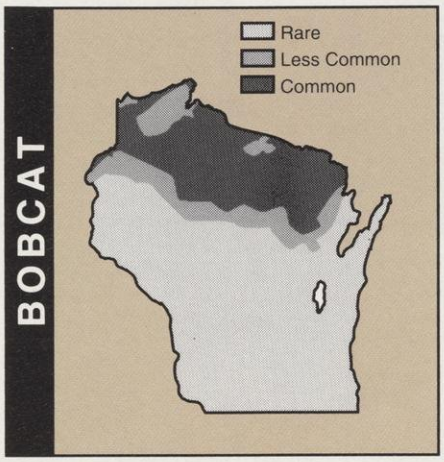
Bobcat fur is short and very soft. They appear to molt twice a year, spring and fall. The summer coat is shorter, yellowish or reddish brown streaked or spotted with dark brown or black. It grays up a bit in fall. The winter coat is even grayer, perhaps to better blend in with wintery woods colors. The long guard hairs are tipped in black. Belly fur is white with several black bars along the inside of the forelegs. The short tail has several black bands that grow darker toward the tip.



STEPHEN J. LANG

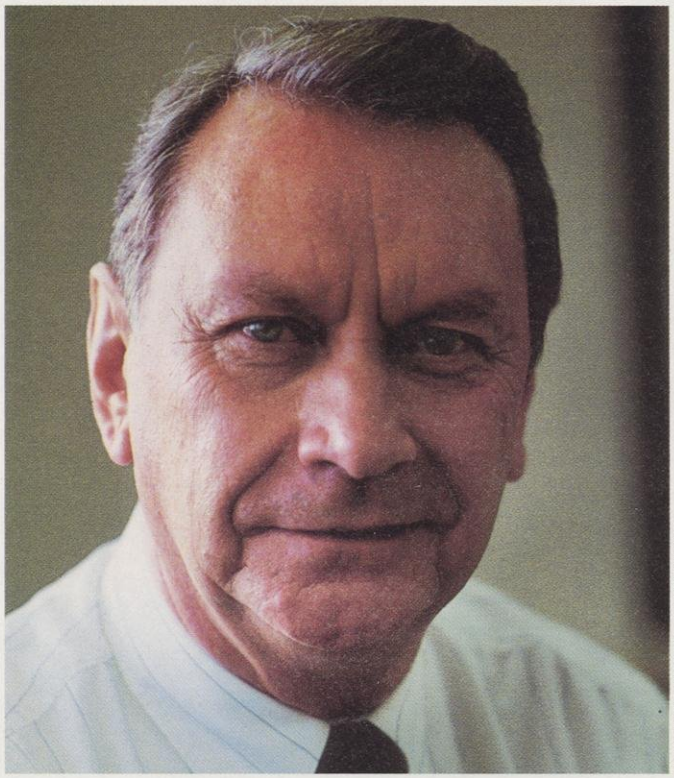
Methods to manage bobcats include tracking surveys to locate animals and estimate population trends. Trappers must submit bobcat carcasses to DNR researchers who age the animals, examine how many litters females have borne and examine their general health. The trapping seasons have been changed several times in the last 22 years to ensure that bobcat populations will be sustained in their natural range. The current season restricts trapping to one bobcat per year in the region of northern Wisconsin above Highway 64. □

James E. Ashbrenner is a DNR wildlife researcher in Rhinelander, Wis.



STEPHEN J. LANG

Lessons from our leader



ARTICLE PHOTOS BY ROBERT QUEEN

A conversation with retiring DNR Secretary C.D. Besadny

David L. Sperling

Carroll Dennis Besadny retired on January 8th as Secretary of the Department of Natural Resources after a 40-year career. Besadny served in many capacities starting as a wildlife researcher in 1952 for the Wisconsin Conservation Department. He subsequently was project leader on pheasant research, research coordinator, first Director of the Bureau of Environmental Impact and Administrator of DNR's Division of Resource Management overseeing fisheries, forestry, parks, wildlife, land acquisition and research programs. He was appointed agency Secretary in 1980. Besadny is past president of The Wildlife Society, the International Association of Fish and Wildlife Agencies, and former President Bush appointed him to the Great Lakes Fisheries Commission in 1990. We asked Secretary Besadny to reflect on four decades of service to Wisconsin's people and natural resources.

Important issues in a 40-year career

- Pheasant research on winter cover needs, secure nesting cover and survival of stocked pheasants
- Environmental model for shipping coal — developing air, dust and runoff controls for a dockside yard to transfer coal from trains to Great Lakes carriers in downtown Duluth-Superior
- Assessing the environmental consequences of power plant siting (proposed Koshkonong nuclear power plant and Columbia I coal-fired plants)
- Negotiating Chippewa Indian treaty rights relating to fish, game and other natural resources
- Building working relationships with the Department of Transportation on road building (I-43, Hwy. 51 Portage to Merrill, Madison's South Beltline)
- Public purchase of the Chippewa and Turtle Flambeau flowages
- Launching the Lower Wisconsin Riverway recreational corridor
- Overseeing rails-to-trails conversion for recreation
- Forming a strategic plan for DNR
- Setting strategies on acid rain, groundwater protection and air toxics controls before federal mandates
- Meeting federal fishable and swimmable goals for our surface waters
- Establishing wasteload allocation in both water and air (emissions trading)
- Ensuring grants and loans for operation and maintenance of wastewater treatment systems
- Developing workable standards on water quality in wetlands
- Creating a national model for nonpoint source pollution abatement
- Developing groundwater law and preventive action limit zone concept
- Developing a management program to protect endangered resources

Q. *Among your accomplishments, you highlighted better working relationships with the Department of Transportation. Why?*

A. Because road-building is one of the major ways we change land and the environment. Setting a solid working relationship with the DOT was among the most important things that happened. The concept of wetland mitigation (minimizing damage to wetlands and replacing or reconstructing lost wetland acres) grew out of that early work. The two technical staffs now talk before new roads are proposed over water bodies, through wetlands and other sensitive areas.

Before, it was tougher to get the design engineers to understand our concerns. Now, there's more understanding, much earlier involvement, and the controversies are less heated. There are still folks concerned about highway building, but many of the environmental consequences have been resolved.

Q. *Wouldn't this same early cooperation help DNR work more smoothly on projects with other agencies like the Department of Development or the Department of Agriculture, Trade and Consumer Protection?*

A. It would. One idea we coined early in our relationships with other public agencies and private groups like utilities and paper companies was: "See us early, see us often." That has become a real positive phrase, especially for the bigger companies.

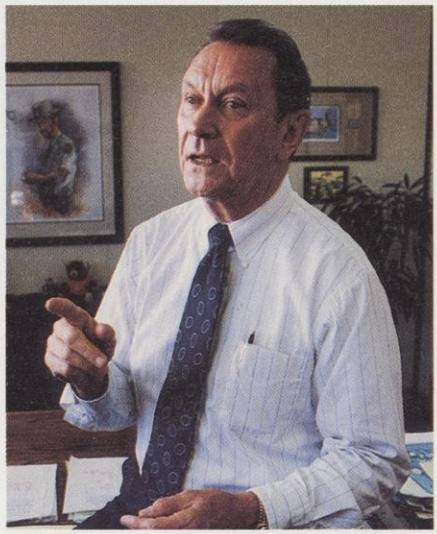
In the early days, for instance when Columbia I power plant was developed near Portage, it was common practice for a utility to come in with final plans. They were ready to develop before we even started talking. When the company found out we had problems with the site location and proposed developments, a lot of expensive plans had to be scrapped. A large portion of the power plant would have been built right down in the floodplain, which would have created problems for the City of Portage. The utilities had just assumed "Here's how we're going to do it and let's go."

As a result, we learned the importance of customer services to the companies and the public who may be affected by decisions. "See us early and see us often" became a motto for guiding projects rather than having a major confrontation. Many of the bigger firms that employ environmental engineers or managers now come to the department when expansions will clearly require permits. That advance information helps determine if proposals will likely meet air and water standards before plans are set in concrete.

We made some headway with the utilities by likening that approach to their public campaign encouraging the public to contact the utility before they dig where gas, electric, water and phone lines are buried. Why? Because if you cut utility lines or pipes, you've created major problems.

Q. *Would that approach help us prevent groundwater pollution from land-use practices on agricultural lands?*

A. It might, but many land uses don't fit that model. We don't hear from landowners before they propose spreading fertilizers or other chemicals. Society assumes when people carefully follow package directions, there is going to be no problem. For some chemicals, like aldicarb, we later learned that there *was* a problem with groundwater. For agencies like ours, it can be more difficult to anticipate proper environmental management for individuals because companies file plans before they act.



Q. *How difficult a challenge do we face convincing the public to clean up pollutants we can't see or sense, especially when exposure to these materials may not produce health problems for 20-30 years?*

A. Those are difficult because at times industries and municipalities have said to us "Well show us the bodies before we do anything." We've always said, once we can show bodies, you're too late in the game. When you can't smell or see pollution, it's harder for people to believe that there is a serious problem. Once the visible pollutants are cleared up, everything looks fine, but it may not be. More education can show there are still other things that are important to human health. We try to be reasonable in setting regulations, but we remain concerned about consequences for human health, even for the one-in-a-thousand or one-in-a-million risks.

> "See us early and see us often" became a motto for guiding projects rather than having a major confrontation.

When I think about this, I remember a conversation I had with the mayor of a large community in the former Soviet Union. The town was built 17 years ago as a company town for workers at a new truck factory. We were discussing the plant and I asked him if there were any local environmental problems as it was obvious this plant had few environmental controls. He said "Absolutely none." I then asked if there were any human health problems in the city. He said families in the community had experienced an unusual number of birth defects and pregnancies that ended when the child couldn't be carried full term. Yet he didn't relate that to the only industrial plant in the community. As visitors, we knew there were problems because our eyes burned and our throats were sore after just a short

visit to the factory.

By recognizing health problems, we've done a lot to control air and water toxics. Yet, we can't rest on that achievement. Every year thousands of new chemicals are being manufactured.

> Once you get beyond the technical analyses, you face the social, political and financial implications. People only obey laws up to a point that makes sense to them.

Many are beneficial, but some will have synergistic effects when they combine with other compounds over time. An agency like ours needs to work closely with the Division of Health to make sure that we're on top of health concerns that arise.

Q. *What about this concept that future environmental improvements will come by changing activities at home as much as by controlling industries?*

A. Changing people's habits becomes even more difficult because none of us really like a lot of regulation, even if we know exactly why some law is needed and how we're a part of the problem.

Take nonpoint source pollution as an example. We're not dealing with end-of-the-pipe industries. In fact, we may be dealing with hundreds of rural and urban families in a watershed. Each may add to the problem by using lawn fertilizer, letting stuff run into the street or letting pesticides and fertilizers drain off farmlands. Each owner doesn't feel a part of the problem. They say "I don't want to be regulated. This is my land and I'm going to do what I want with it."

Once you get beyond the technical analyses showing where environmental problems start, you face the social, political and financial implications. People only obey laws up to a point that makes sense to them. That's why we have stop signs and speed limits on roads. Yet very few people want to yield the right-of-way and very few drive exactly at 55 mph on the highway. Everybody wants to push that extra bit.

That first wave we talked about — cleaning up conventional pollutants — was costly but not impossible to achieve. The second wave, the much smaller group of toxic materials that you can't touch, feel, see or smell, is even more costly to treat. When we start talking about that third wave, changing people's attitudes and lives, we find even more resistance.

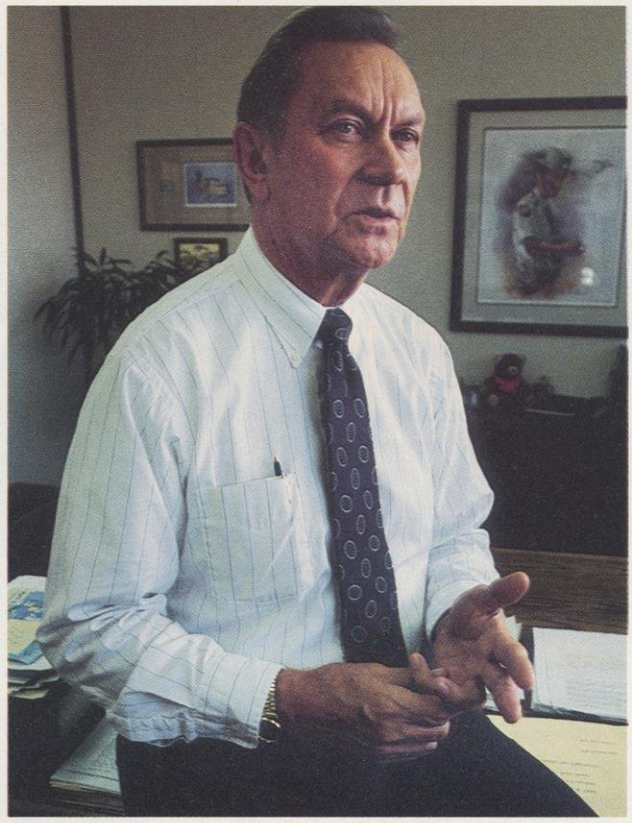
On land-use restrictions

Land-use activities are equally tough. If you're told that you shouldn't cut, fertilize or water your grass, some people are just going to say "Hey, wait a minute, this is my property. I want to make it look nice and I really don't care. I'm going to do it my way!"

It's not that different when we attempt to buy land for public use. People don't want landfills near their back yard, but they often don't want parks or trails either. As we start dealing with individual human values, people want government off their back. They don't want to be told what to do...until something happens. Immediately after something goes wrong, those affected say we need a regulation to stop that activity. It becomes a very personal problem to protect private land rights. You have to look at the history of how natural resource laws were formed. Early regulations were developed to protect business against itself, against unscrupulous people. Later, natural resource laws were developed to protect the environment.

On the other hand, most people will try to be good land stewards, and they don't need government telling them how to protect their land.

I'm struck by how differently these decisions are made elsewhere. In China, we visited a huge natural area, about 500,000 acres in Heilongjiang Province, set aside for rare cranes that could only nest and reproduce in this one area. There was consensus to protect those cranes, but that decision meant that all of the peasants who lived there were moved off the property by the government. We would never do that here, yet we find similar conflicts on a smaller scale when we find a rare species of animal or plant. There are those who say "Why do we have to protect those few frogs that we find?" and others who are very concerned about saving all the diverse forms of species we can.



Q. *Let's turn now to some areas of unfinished business, some challenges that remain. I know you are concerned about long-term loss of soil, wildlife habitat and prime farmland.*

A. Just between the fifties and the 1990s, we've seen significant changes in agricultural practices — earlier hay mowing, larger fields of corn or soybeans, less secure nesting cover for ground-nesting birds, major changes in songbird populations and so on. I wonder where the meadowlarks and bluebirds are. Today, we only see remnants, but in the fifties we saw lots. Land use has changed so much — urban encroachment, agricultural practices that get the farmer in the field earlier and earlier. Each has taken a toll. On the other hand, farm programs now encourage more set-aside lands. That's helping wildlife, supporting crop prices by cutting over-production and it's giving us at least a temporary opportunity to use the land judiciously for other things. Wildlife, both hunted and nonhunted species, have certainly been a major beneficiary of these programs.

Soil erosion has been cut too. I sit on the Land Conservation Board which set T goals or tolerable soil erosion losses for the year 2000. Many areas in the state are meeting those goals through different tillage practices, set asides into grasslands and other secure cover.

Q. *What about implementing the Clean Air Act?*

A. That law is going to change some lifestyles, especially in southeastern Wisconsin, once the program falls into place during the next four to six years. Once that happens, people will question why. That's only natural.

It happened in the mid-1980s, too, during the acid rain debate. I was part of a three-person committee with Mary Lou Munts, who chaired the Public Service Commission, and William Keepers of Wisconsin Power and Light Company. Our collective staffs put together the nation's first acid rain legislation. There was a lot of concern and emotionalism over that. Some utilities said "No way can we meet this. We can't reduce sulfur dioxide in the timeframe you have set up. It will be real costly, electric rates will skyrocket," and so forth. None of those things happened. And the utilities are achieving their emission rates and doing really well. Moreover, they got a jump on everybody else. That has made Wisconsin utilities the beneficiaries of emissions trading. Some people don't like that concept, but state utilities have achieved things that others haven't, and at a lower price than it will cost to reduce emissions now.

On wasteload allocation

It's the same story with the wasteload allocation program to reduce pollution on the lower Fox and Wisconsin rivers. We were the first in the country to come up with that system because we have so many industries and municipalities discharging into small sections of these rivers. I remember the headlines in the early 1980s when we started the wasteload allocation. Companies threatened to move. They said they wouldn't be able to expand operations. They said the system wasn't needed to protect the river. And yet, the system is all in place now. Every municipality on the river has grown. The paper industry on those portions of the river has expanded several fold, they are still meeting the discharge limits that were set, and they are doing well. They are very competitive with their industry in other parts of the country.

The system proved its worth in 1988 during a severe drought year. I remember when Tom Schmidt of the Paper Council and I appeared on a TV program and he said without wasteload allocation, our pulp and paper industries would have had a tough time discharging because of low water flows and high temperatures. You see, wasteload allocation was designed to ensure the environment would be protected, even when natural conditions were extreme, and that system kept those companies going. The firms were geared for those conditions and could produce pulp and paper without cutting back. So wasteload allocation really helped state industries prepare ahead of time.

It was the same story in the mid-1960s when we started controlling conventional pollutants like suspended solids and BOD. And we'll hear the same arguments over air and water toxics rules we're advancing now. I think it's a defense mechanism. People eventually understand the system works, and it has to be done to protect the environment and maintain a quality of life for which Wisconsin is noted.

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Q. *What about sediments? Many discharges have been stopped but the pollutants from earlier years are still trapped in our riverbeds and harbors.*

A. A major problem. We keep putting out fish advisories for problems that are not primarily caused by what's coming out of the pipe today. It's a matter of what's already in the bottom sediments that gets stirred up by wave action and human activity. These materials get re-suspended, the bottom organisms pick it up, the plants pick it up, the fish pick it up and we have toxics problems. So now we're faced with providing answers to tough questions: How much to clean up? How to clean up sediments without spreading pollution further? What do we do with

the stuff we dredge? Can we safely cap material in the water? And who should pay for that work?

Unfortunately, we become smart too late in life and we realize these clean-ups are extremely costly. That's why we need to stress pollution prevention, which is now a major effort for our department.

On leaking underground tanks

Those same tough choices will guide our programs to recover the environment around leaking underground petroleum tanks: Each is a costly problem. Some have been leaking for years. We'll reach agreement on how much to clean up and how much to protect. However, when it's *your* own groundwater that's contaminated, you surely want somebody to do something about it — and quickly. Whether it's your neighbor, a business or a city, you want to protect your life supply of water.

In portions of China, with 3,500 years of society, hundreds of years of continual pollution discharge into river systems, and groundwater polluted as far as you can determine around huge cities, there isn't enough money or technology to clean it up. So the people there are resigned to boiling water from now until the end of time or only using tap water sparingly for washing. Those are decisions we were never meant to make.

Unfortunately, we become smart too late in life and we realize these clean-ups are extremely costly. That's why we need to stress pollution prevention.

We learn a lot about ourselves from wildlife. We raise wrens in our back yard in little wren houses. The wrens come back every spring to the same houses, but they want to make sure the house is clean before they get there. Wrens want fresh stuff. If there happen to be some twigs left in the box, they throw them out. Then they build their nest and hatch the young. While they feed the young, the adults take the droppings out with them. That nest is always clean. The adults fly a good distance from their nest before they get

rid of the droppings. They want it far enough away and they don't want to attract predators in the area. When you clean that house out in the fall, the nest is perfectly clean — no droppings. I think the wrens are telling us that if you want to survive and raise a family, you need to have a clean nest. I think that's an extremely important lesson. If we're going to survive, we need to keep our nest, Earth, as clean as we can.

On work with foreign countries

I'm pleased that we're working with foreign countries that have asked for help because of our good record and our expertise. We've sent DNR people to the former Yugoslavia and Czechoslovakia to reduce air pollution. I remember seeing young people in Beijing wearing facemasks in the daytime because they didn't want to breathe the particulates that you could see in the air. I think it's great that we can send some of our technical people overseas and invite foreign neighbors here to share what we've learned.

Q. *What about the future for recycling?*

A. Well, we certainly helped the general public learn how it could be done, and they responded. Back in WWII people recycled because resources were quite scarce. We recycled everything — tin cans, rubber, oils, paper — and we learned that nothing needed to be thrown away. Then the war ended, the economy shifted, and we became a throwaway society. I think we are going to see more and more recycling which will create markets because when warehouses are full, people will find a way to get rid of these materials. So markets eventually get created.

Q. *During the war, government got directly involved subsidizing those markets and making it easier to transport waste to the marketplace. Where do you think we're headed in that? Secondly, during the 1940s, more of the materials were made of one material. Now, composites of wood, plastics and metals are tougher to get apart.*

A. I think consumers will demand more products that are recyclable. It's easier to identify products with uniform coding. Disposal costs in many communities are priced by the bag of garbage, so there's pressure on manufacturers to change their packaging and containers so more can be recycled.

I have a concern about what length we should go to subsidize markets. I think it's fine to start out subsidizing entrepreneurs and companies to get them moving. Then I think government has to back off. We've seen what can happen. The tremendous cost of subsidizing the agricultural community, some industries, even municipal wastewater treatment plants. When we started the Wisconsin Fund back in 1978 it was supposed to be a pay-as-you-go wastewater abatement program. Eventually it became a bonding program. It was an easy decision at the time, but it has been costly, and I'm not convinced communities understand their responsibility to the environment as a consequence of this public investment. If communities, business or government use and abuse the environment, they should pay for it.

It's good to get communities started, but I think we can outdo ourselves with

significant taxes and bonding. Nearly two thirds of the state tax dollars we bring in now are used to pay off bonds for past commitments. Congress and the Legislature have to really come to grips with how indebted we can afford to become. I know our Board is concerned about this. At the same time, without such programs we wouldn't be where we are today with municipal clean water programs or our long-term land acquisition programs for parks and recreation lands.

> If we're going to survive, we need to keep our nest, Earth, as clean as we can.

Q. *Let's look at other future issues. How will the fact that more people live longer, healthier lives affect use of our recreational properties?*

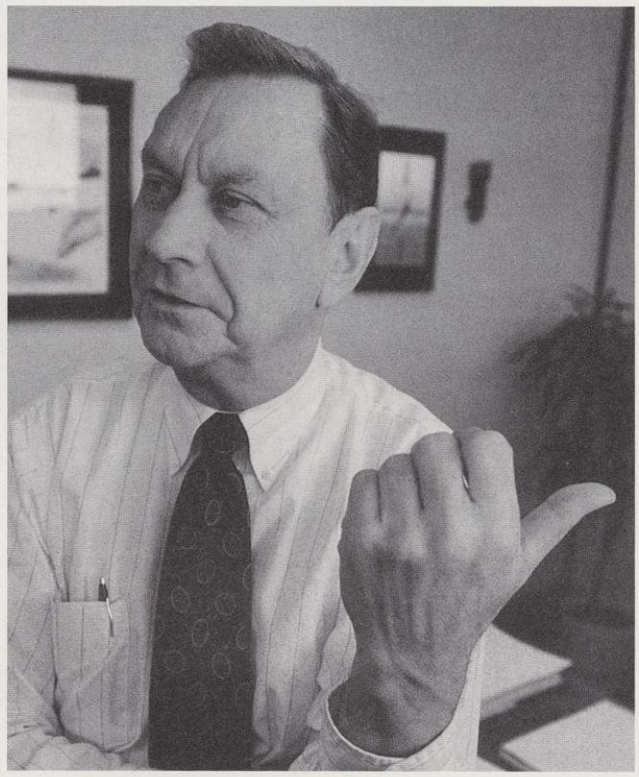
A. We're seeing some of those effects now. Not necessarily from "graying" but certainly from our ability to use the outdoors longer. Better clothing and equipment has made it more comfortable to recreate outdoors throughout the year. For instance, widespread interest in snowmobiling and cross-country skiing is relatively new, and each requires trails. Retirees have more time to spend in parks, they have the time to use them mid-week and late in the fall. Properties have to be staffed longer. Our wildlife areas used to produce activity for hunters in fall. Now nonhunters want to use these areas year round. Forest stands now must produce experiences and aesthetics as well as fiber.

Q. *At the same time demand grows, many of our parks are aging.*

A. Our park system started around the turn of the century. Some still have the original buildings which aren't accessible to people with disabilities. Others properties may not have decent sanitary facilities or they may be deteriorating. Our water supply and distribution at Devil's Lake State Park is 60 years old and it just pooped out this fall. Thank goodness it happened at the end of the season. We have to spend a lot of money to redo it. Other parks need to substitute toilet facilities with running water for the old pit toilets. People also want better amenities like showers and boat launches. We'll see the same pressure along trails for hikers, bikers, skiers, snowmobilers or horse riders. There's growing demand for toilet facilities, drinking water stops, and other amenities along the trails. Whether provided by private businesses or the state, users clearly want amenities.

Q. *What are your speculations on the future of hunting as an outdoor pastime?*

A. I'm not sure. Wisconsin and some other northern states have such a long hunting tradition, in spite of the move from rural areas to the cities where it's easier to lose touch with nature and the land. As the eastern states become even more populated, they will find more problems first. Hunting areas will be limited. Hunters may give up or may decide to take their annual hunting trip to states with stronger hunting traditions, states where the pastime will always be there. I hope Wisconsin is among them.



On mining

One issue that's always emotional is mining. Obviously, you can't just site a mine anywhere, it has to be where the ore body is. Even in remote areas, people will say they don't want mining at all because it's going to affect their life in some way; something is going to be discharged somewhere. Some local people will say they need the mine because it will create jobs for 15-20 years and enhance the economy. Of course, when the mine is gone, we'll deal with that, or somebody else will.

The Jackson County iron mine was developed with some controversy and now it's gone. The mine is closed, the reclamation plan is in place, and people already forgot about it. The county has taken over the recovered property

Mining is an emotional issue and the Legislature has to make a decision whether mining as an activity should continue or not. So far, as long as a mining proposal can meet the environmental rules, the department must issue a permit.

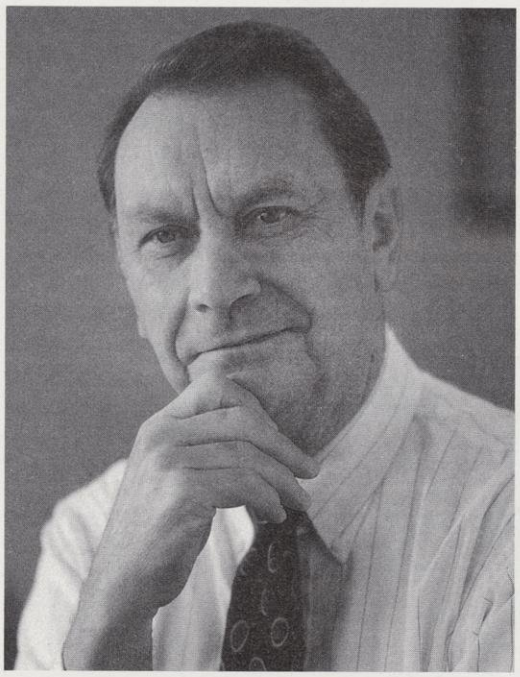
There are more basic questions, however. If we need the minerals, can we really say "not in Wisconsin"? "We'll let you continue to mine in another place and we'll take your minerals for our benefit, but you're not taking our minerals"?

It's the same issue surrounding hazardous waste sites. We have no sites in Wisconsin. We ship material out of state, a lot of it to approved sites in northern Illinois. There are people in Walworth and neighboring counties who are saying they don't want "Illinois' trash" in

Wisconsin. "Keep it out of here." Yet they forget that we're shipping our hazardous wastes over the border. It becomes a social issue as well as interstate commerce.

Q. *Will these same issues extend to handling nuclear wastes?*

A. Yes. I spoke to Wisconsin Power and Light's Board of Directors and staff in Sheboygan last September. Someone asked if I thought we'd site nuclear plants again in Wisconsin. I told them bluntly that it wouldn't happen until the utilities and government find a way to safely dispose of spent nuclear material for the long term. When the plants were built, people were concerned about the front end, not end products. The idea was to build a plant, get it going and worry about spend fuel rods 20 or 30 years down the road. That time has come for a lot of plants. We have to resolve that problem before nuclear energy will move forward again. And the WP&L people agreed with me.



I believe nuclear power plants are safe. They generate electricity a lot cheaper than at coal-fired plants. They are better environmental plants, but that end product is a huge problem.

Q. *People reflecting on your management style, on your attributes that make you an admired leader, describe you as a creature of habit; habits that have given you stability and an ability to concentrate on the extreme time demands of your job. They admire your grasp of issues, ability to recall either broad concepts or details when you need them to make a point.*

A. When you're dealing with managing and protecting natural resources, it helps to have that long-term continuity and understanding. You need a long institutional memory, even though things change fast. That's what made this agency strong. In the last 45 years, there have only been four agency heads — Since 1947, Ernie Swift, then Les Voigt, Tony Earl and me. No other agency has that span of service, and it's part of what has given us better understanding of managing resources and tackling tough issues.

I believe you have to have a sense of the past to keep a steady track of the present and future. That gives stability to staff, too. They know the extent of their authority. They've got the flexibility to manage and resolve problems that take time. I liked my job and my staff have been just great. They know my style of management and they know I will support them when tough decisions need to be made.

Q. *That spills over into the Secretary's role as the caretaker of both an integrated agency with resource management and environmental responsibilities, and an institution managed by a citizen board.*

A. A lot of states aren't fortunate enough to have that system, and their continuity disappears with changing political climates. Our board system provides a Secretary with longer continuity. Consequently, staff don't spend as much time gearing up to somebody else's style. That doesn't mean that changing leadership is bad. The policy board changes fairly frequently, but it doesn't take them long to understand the need for that long-term vision. Our shareholders, our people of the state look for that long-term dividend we provide.

And we'll see what those dividends bring. If you can instill a sense of trust in the staff and a sense of pride, they continue in spite of leadership changes. Take a look at the number of people retiring with 25, 30, 35 or more years of service. That's a lot of commitment and dedication. And I suspect we'll continue to see that. Remember, there's only one person here [in the Secretary's chair], but there are 2,900 people on the staff.

I believe you have to have a sense of the past to keep a steady track of the present and future.

We've got a tremendously dedicated staff in the Department of Natural Resources, regardless of their job. I think it shows when we get national recognition, when foreign countries choose to come *here* to ask for guidance, help and technical assistance.

I'm real proud of what we do. The powerful issues we deal with on a daily basis will naturally come with a certain amount of criticism. And we make mistakes. But we try to make sure that what we're doing for the environment today will be meaningful for those people who come later, like the wrens who will come back next year because they've got a good environment to rear a family, and their young come back to rear a family later. I've been in this agency 40 years and I have seen staff commitment the entire time. That's what made our agency strong and internationally recognized. It's our tradition. □

David L. Sperling edits Wisconsin Natural Resources magazine.

Readers Write

LESSONS REMEMBERED

I appreciated your October insert on 25 years of hunter education. I was 13 when I took the Hunter's Education Safety Course in Mosinee. This was the only way my Mom, Dad and Grandpa would let me out in the woods with a gun, though I'd spent a couple seasons hunting without a gun to gain understanding and appreciation for the sport.

I'll never forget our first class when instructor Galen Parkinson asked if we thought the rifle he was holding was loaded. We laughed because we were sitting at desks in the high school biology lab. Seconds later, as I crawled out from under that desk checking the ceiling for holes and my pants for wetness, I learned a lesson I've since remembered — treat every gun as if it were loaded!

I haven't hunted in a few years, but I'm a landowner and I appreciate hunters asking permission to use my land, another lesson from my course.

We have so much natural beauty here to share. If we continue to teach all sports enthusiasts about safety, courtesy and respect for land as well as other people, then outdoor sports, including hunting, can be enjoyed by future generations.

Ralph G. Luedtke
Saukville, Wis.

NATURE FAN

I love the outdoors and like to read nature magazines. I like yours best because the articles relate to nature and the environment, and I really like the pictures.

My Dad and I are licensed game farmers and have been raising pheasants for the past three years. We really enjoy this hobby and will continue for many years to come.

Aaron Rofritz
Cedarburg, Wis.

ABOUT SOY INKS

Please tell me what soy ink is. I notice that your magazine and envelopes from the DNR are printed with soy inks.

Gail Haag
Manitowoc, Wis.

Ink is a complex mixture of pigments, binders and carriers. Carriers allow the ink to flow then they evaporate to leave dry ink on the printed page. Soy-based inks substitute soybean oil for a portion of the chemical carrier. Soy inks are considered environmentally-friendly alternatives because soybean oil is a renewable resource. When soy inks dry, fewer chemicals are emitted to the atmosphere. Most carriers in ink contain volatile organic compounds which evaporate when printing presses heat, then chill the paper to set the ink.

AT WORK IN TEXAS

Thanks for *Wisconsin Natural Resources* magazine. More often than not your articles apply to my work or a current topic. I've loaned several issues to the City of Kerrville planners as they draft ordinances for protecting and properly developing land along the Guadalupe River.

David Litke
Kerrville, Tx.

OFF TARGET

We would like to correct a caption. Our nephew, Kevin Pertzborn of Lodi, Wis., is the bronze medalist pictured [in a group of medal winners] on page 18 of the October issue. Both Kevin and his father are avid trap shooters who would appreciate proper credit recognizing this young man's successes.

Diane and Ken Pertzborn
Rice Lake, Wis.

JOHN THOMSON

(*Ilex verticillata*) Winterberry in winter.

Continued from page 2

While wintergreen and its fruits are hidden by snow, the flame red fruits of winterberry hang enticingly on 10-foot shrubs that are easy to spot in this wintery scene.

Ilex verticillata, winterberry, is Wisconsin's only native species of holly. It grows as a nondescript shrub in wet soil of bogs, swampy deciduous forests and along lakeshores of northern Wisconsin. Dense clusters of slender branched stems are covered with small, oval leaves that look like American elm leaves.

Winterberry plants are dioecious — male and female flowers are on separate plants. The male or staminate flower blossoms in early summer in small bunches along the twigs; female or pistillate flowers grow singly or few in a cluster near the twig tips. Even when the plants are in full bloom, the blossoms may go unnoticed because the greenish to yellow-white flowers are so tiny. It's left to even tinier insects to notice as they carry pollen between plants.

The bright red fruits grow as drupes like little plums. They mature in early autumn, and drop off in mid-winter unless hungry cedar waxwings or pine grosbeaks discover the bounty first.

A less obvious winter resident is the winter wren, a tiny fluff of a brown bird that sneaks about in thick, shrubby undergrowth. As a rule wrens, including most winter wrens, migrate south, but a few hardy winter wrens may overwinter in southern Wisconsin along open streams that are lined with dense shrubbery.

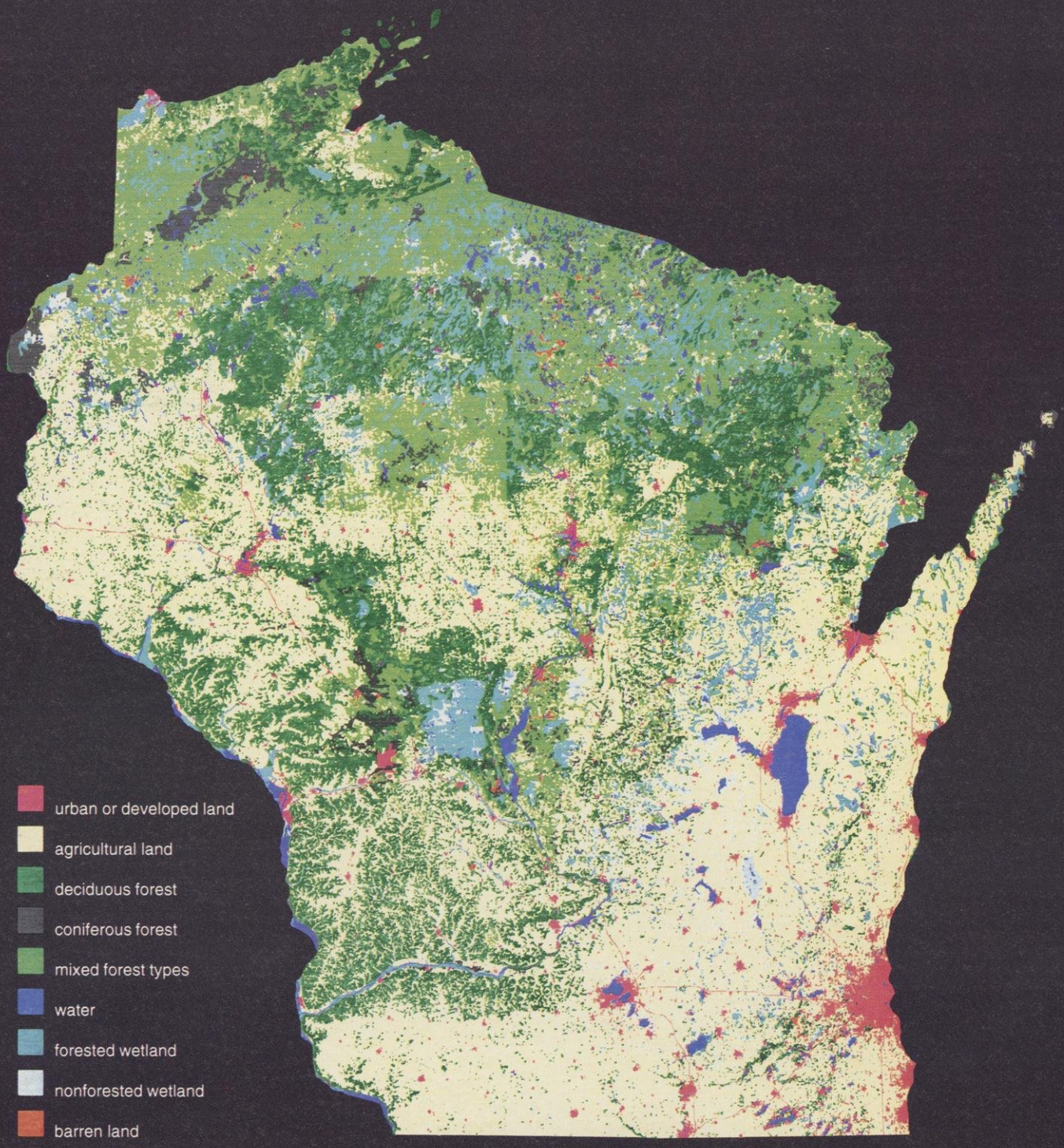
In summer, the secretive, shy four-inch birds with tiny cocked tails inhabit the cool, northern conifers and swamps. Only their lilting, flutelike song lasting seven to eight seconds reveals their whereabouts.

Winter wrens nest near the ground in the cavities of rotting stumps and fallen tree trunks. A bulky stick nest, large for such a small bird, holds a clutch of five to six white eggs dotted with brown. Eggs incubate in about 14 days and the young fly three weeks after hatching.

Winter wrens are more challenging to observe than the stationary wintergreen or winterberry. It's always a treat to see the sprightly bird whose scientific name, *Troglodyte troglodyte*, is nearly as long as the bird itself.

So this winter, whether the snow swirls or the sun shines, go for a walk and experience winter's many moods. In your wanderings, perhaps you'll discover the other "winters" of Wisconsin that give the snowy landscape life and a bit of bright color.

Anita Carpenter explores Wisconsin in all seasons from her Oshkosh home.



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